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# Internet Commerce for Manufacturing: A National Testbed for the Electronic Commerce of Printed Circuit Assembly Services

Electronics manufacturers are contracting an increasing breadth of production processes to their suppliers-a trend which is global, but highly pronounced in North America. Initially the industry saw OEMs divest of component technologies such as PWB (Printed Wiring Board) fabrication. The shift towards outsourcing continues today with board assembly operations. This trend has led to the explosive growth of the OEM's first-tier suppliers, the Electronics Manufacturing Services industry. OEM's were well-positioned to deliver products when they controlled the entire production cycle, but in today's environment the entire supply chain is being challenged to respond quickly to fluctuating demand for products with shrinking shelf lives. The Internet Commerce for Manufacturing (ICM) project is working with industry to develop and demonstrate a suite of web-based standards to enable the electronics manufacturing supply chain to meet current time-to-market demands.

## Presented by Barbara Goldstein

Ms. Goldstein currently serves as technical advisor on e-commerce to the Undersecretary of Technology, on loan from her usual position at the Electronics and Electrical Engineering Laboratory of NIST. She co-chairs National Electronics Manufacturing Initiative (NEMI) working groups and projects involved in IT interoperability within across the electronics supply chain. This work is integrated with NIST's ICM project, which she helped initiate in 1998. She previously developed and managed the Technologies for the Integration of Manufacturing Applications focused program. She has been active in several national and international standards committees, and has chaired an ANSI council on Tools and Technology, and an ISO Process Plants subcommittee.

Scroll to start

*Information Technology*
*for Engineering & Manufacturing*

# Internet Commerce for Manufacturing

## A National Testbed for the Electronic Commerce of Printed Circuit Assembly Services

**Barbara Goldstein**
**Electronics & Electrical Engineering Laboratory**

NIST National Institute of Standards and Technology • Technology Administration • U.S. Department of Commerce

# Printed Circuit Assembly Trends

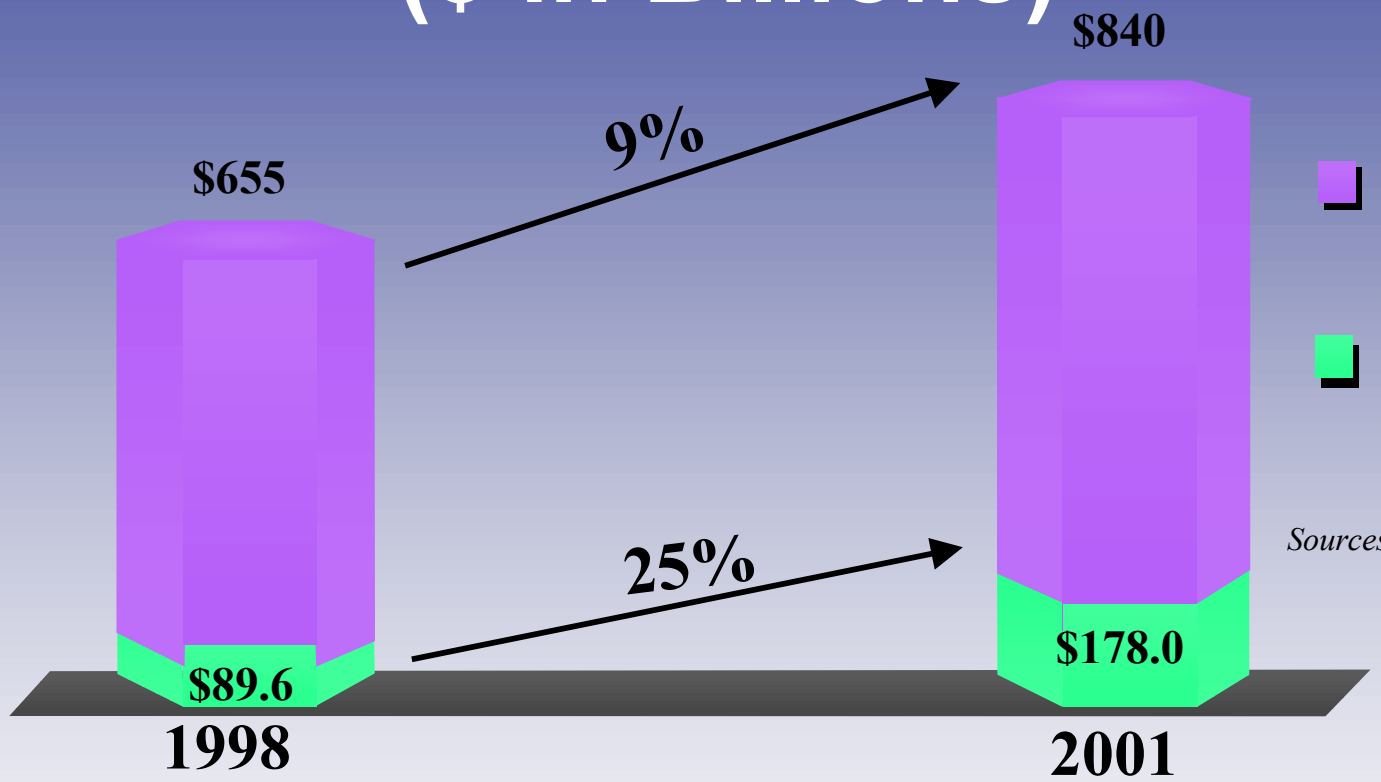
- **Paper-intensive information exchange and old/incomplete standards.**
  An Electronics Manufacturing Service (EMS) provider can spend an entire day extracting needed data from a customer (OEM).
  Impact: Poor information exchange reduces thin EMS profit margins (~ 3%).

- **Manufacturers guess on 80% of customer requirements.**
  - < 20% of new customers provide complete data
  - < 60% of existing customers provide complete data
  - 0% of customers provide data that requires no modifications

  Designs getting too sophisticated for CAM tools to reverse engineer.
  Impact: Supply-chain forecasts are off 40%, on average.

- **Outsourcing growth.**
  OEM's are contracting out a greater percentage and breadth of production processes (e.g. mfg, design services, engineering, testing, distribution, ...).
  Impact: Complex time-to-market and cost of outsourcing trade-off decisions.
  Impact: Growing distributed supply web. Importance of efficient Supply Chain management, collaboration, alliances, partnerships.

# The Outsourcing Trend Continues ($ in Billions)



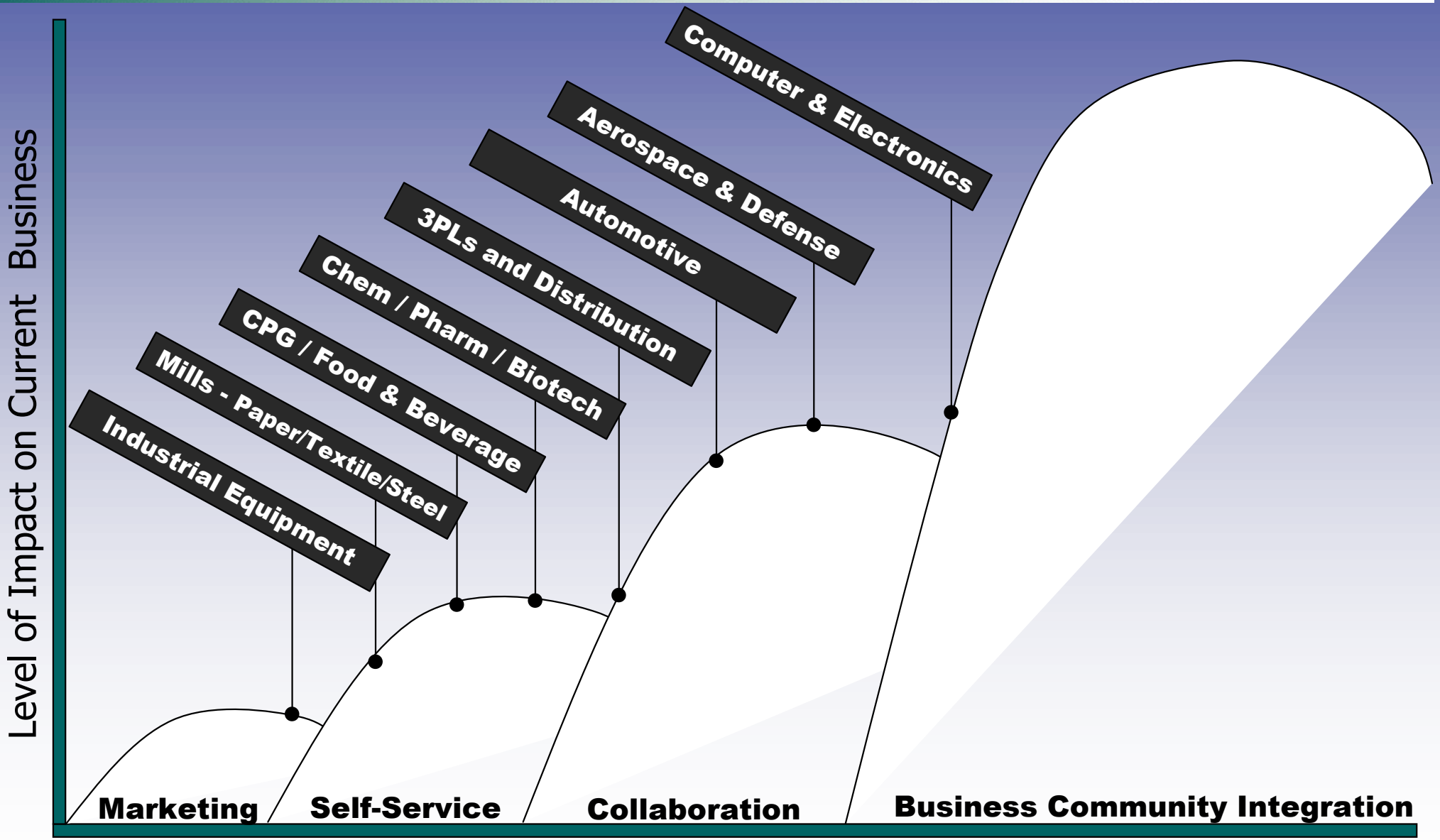

*Sources: Dataquest, March 1998*
*Technology Forecasters, Inc., September 1997*

- The EMS industry is growing and migrating offshore.
- Companies must make Supply Chains function with the efficiency of a single enterprise.

# More Electronics Industry Trends

- Assembly is becoming a commodity. Companies are competing on the strength of their supply chain.
- Industry is moving towards XML-based exchange standards in the near term, with an eye towards data vaulting and data sharing via Application Service Providers.
- Electronics leads other sectors in e-Business integration.

# eBusiness Industry Leaders




SOURCE: AMR Research 2000

# e-manufacturing

AMR Research

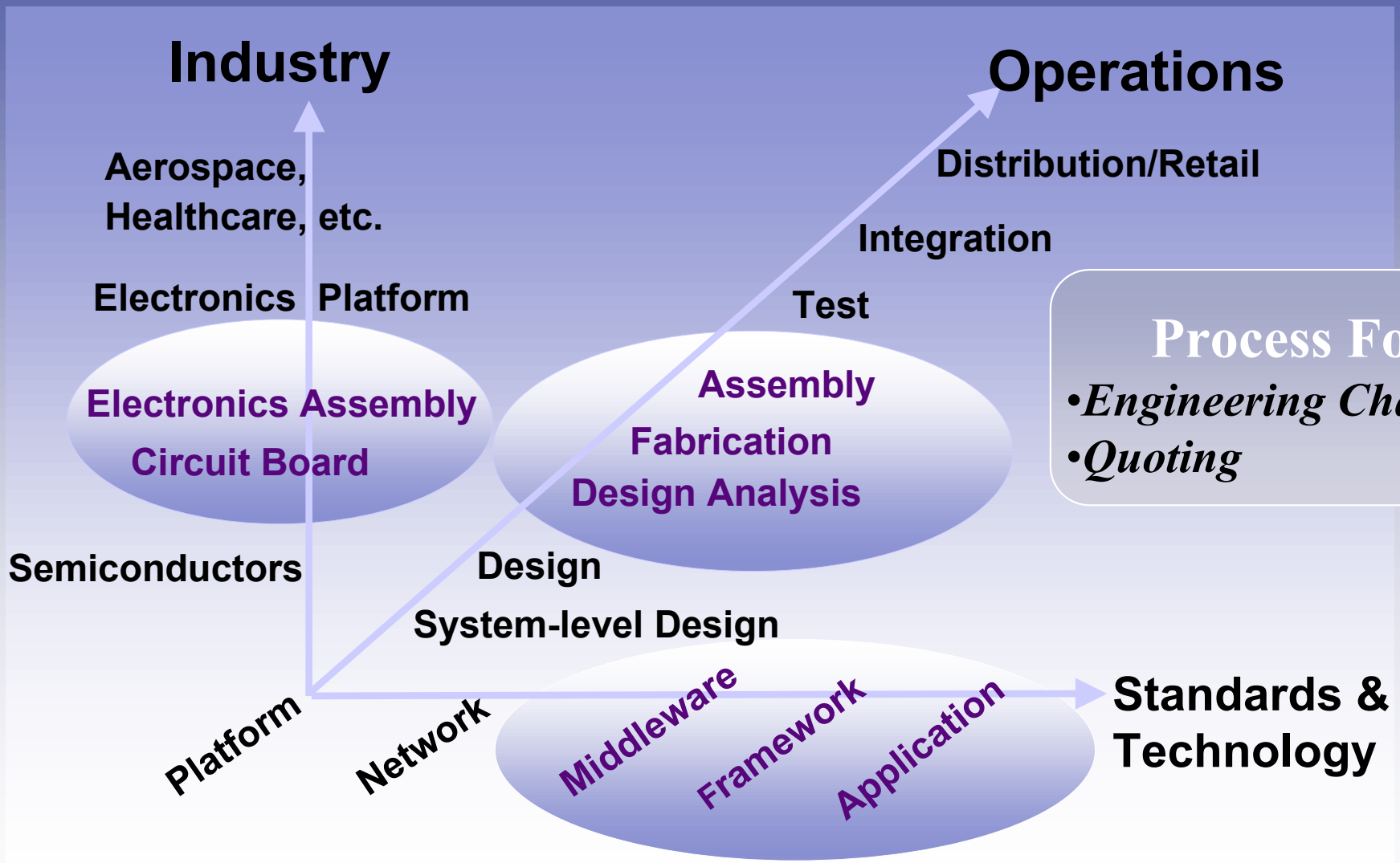
- Electronic management of products and orders on the manufacturing floor.
- Direct transfer of customer order details to manufacturing personnel and equipment.
- Tight electronic connections to suppliers and partners providing visibility across the chain.
- Streamlined New Product Introduction (NPI) processes.

*SOURCE: AMR Research 2000*

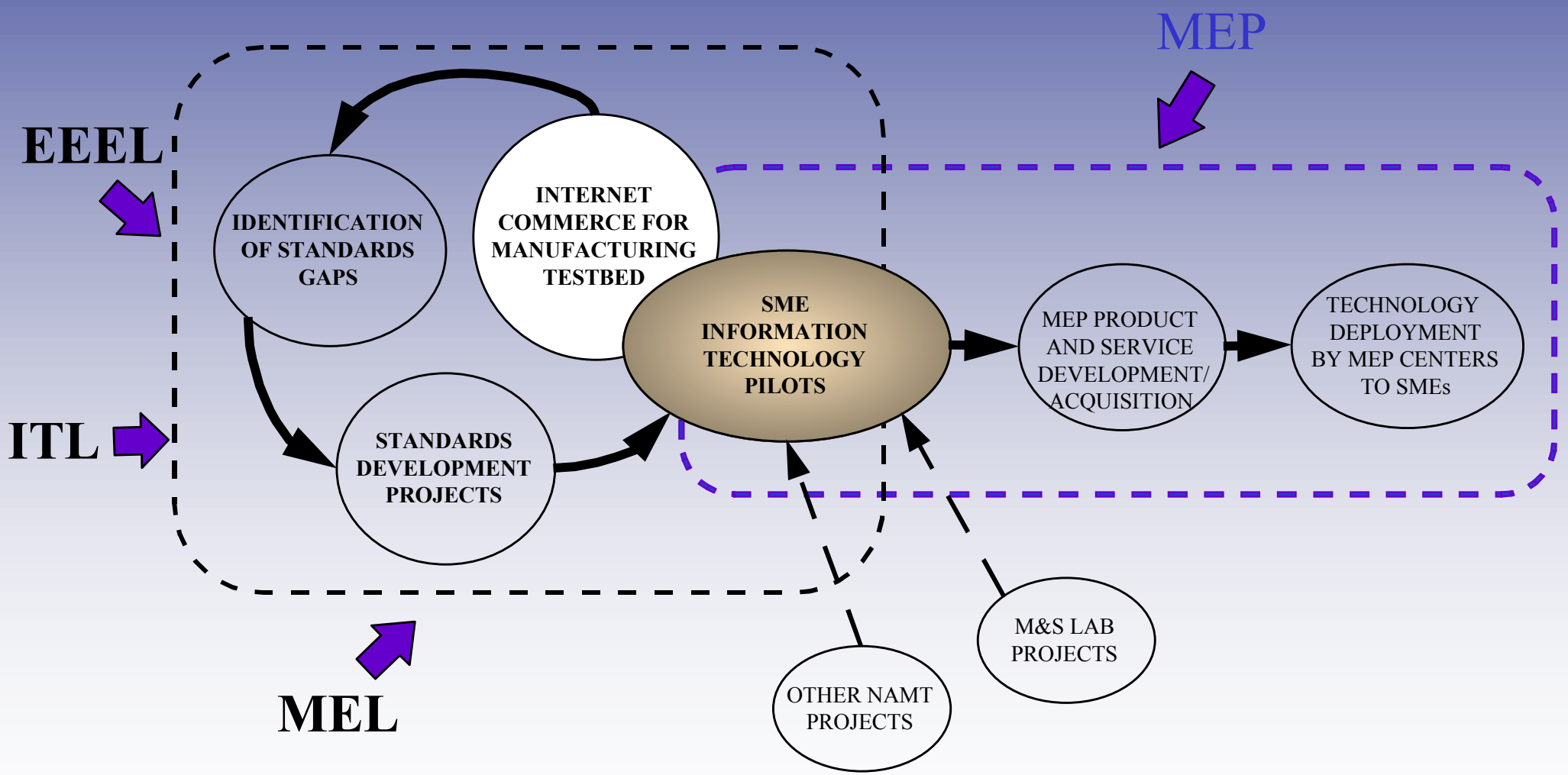
# ICM Project Objectives

- Demonstrate integration of EC services with technical data interchange, to enhance the manufacturing and assembly process for electronic printed circuit boards.
- Enable exchange of build information and change notices for all supply-chain participants to support rapid decision-making and collaboration.
- Provide a flexible test-bed for industry and government to collaborate in testing and evaluating standards-based tools and integration technologies.

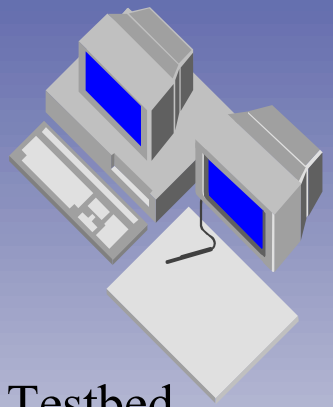
# ICM Project Focus



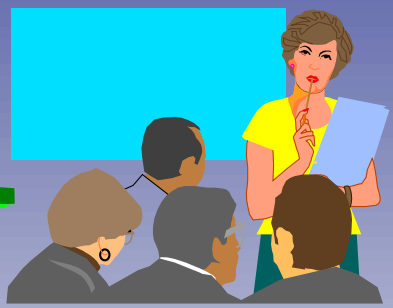
# Project Strategy



# ICM Technical Approach



Testbed



Industry Collaboration

ICM

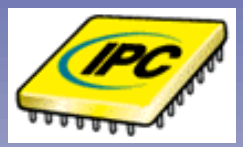
Pay-Per-Use
for SMEs

Standards Development,
Testing & Evaluation

Collaboration and Integration
Technologies

# ICM Partners

## Standards Development:




IPC GenCAM


NEMI Plug & Play Factory

eCo Working Group

## Technology Development:

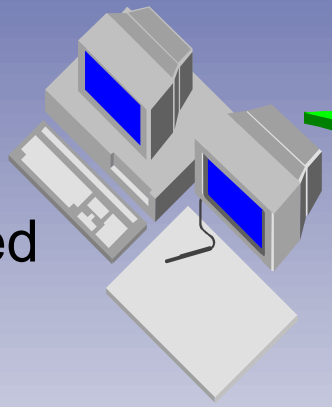
UMBC



## Software & Services:

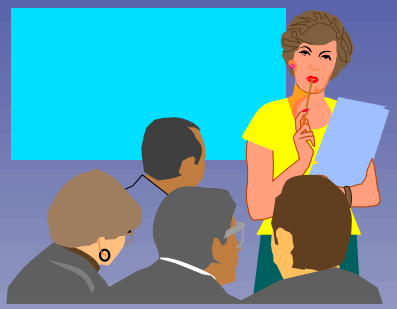

# ICM Accomplishments

**Demo Established**
**Boards Procured Electronically**
**Acting as 'OEM' in NEMI**
**Testbed**



Testbed

**Business Case**
**Activity Model**
**Process Model**
**Scenario Workshops**
**Architecture Workshop**



Industry Collaboration

**ICM/VITSS**

Pay-Per-Use
for SMEs

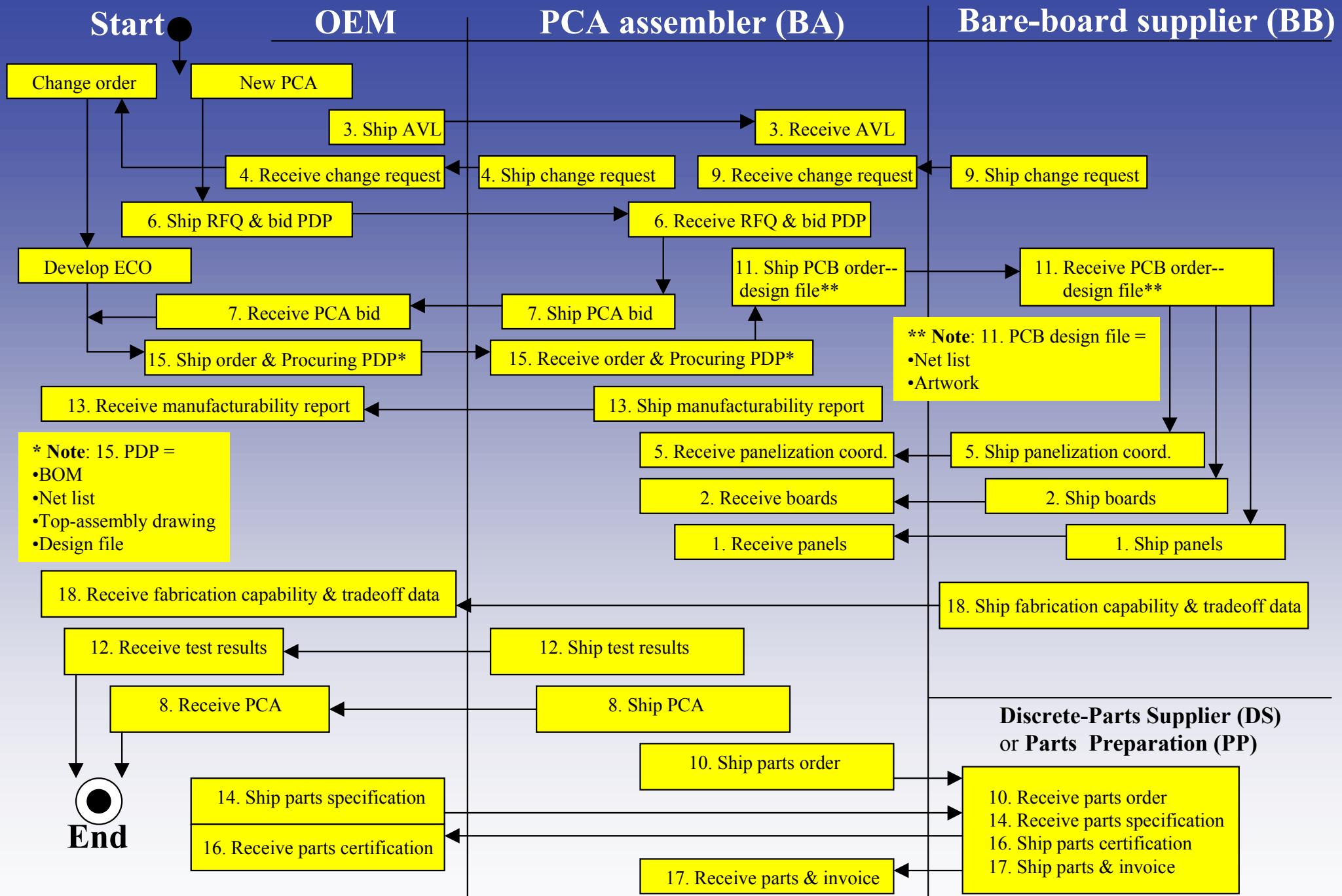
**Component Catalog**
**Manufacturability Analysis**

Standards Development,
Testing & Evaluation

**eCo Working Group**
**IPC GenCAM Test Module**
**NEMI Standards**

Collaboration Technologies

**Quoting**
**Change Management**
**Agent framework & business case being developed**




# *Transaction-Occurrence Model*

NIST National Institute of Standards and Technology • Technology Administration • U.S. Department of Commerce

# “PCA on the Web”

Bookmarks Location: http://www.eeel.nist.gov/~parks/icm/pcafiles/DDS_CLKS/index.html What's Related

Instant Message Internet Lookup New&Cool NEMI Plug and P

## DDS Clocks Board

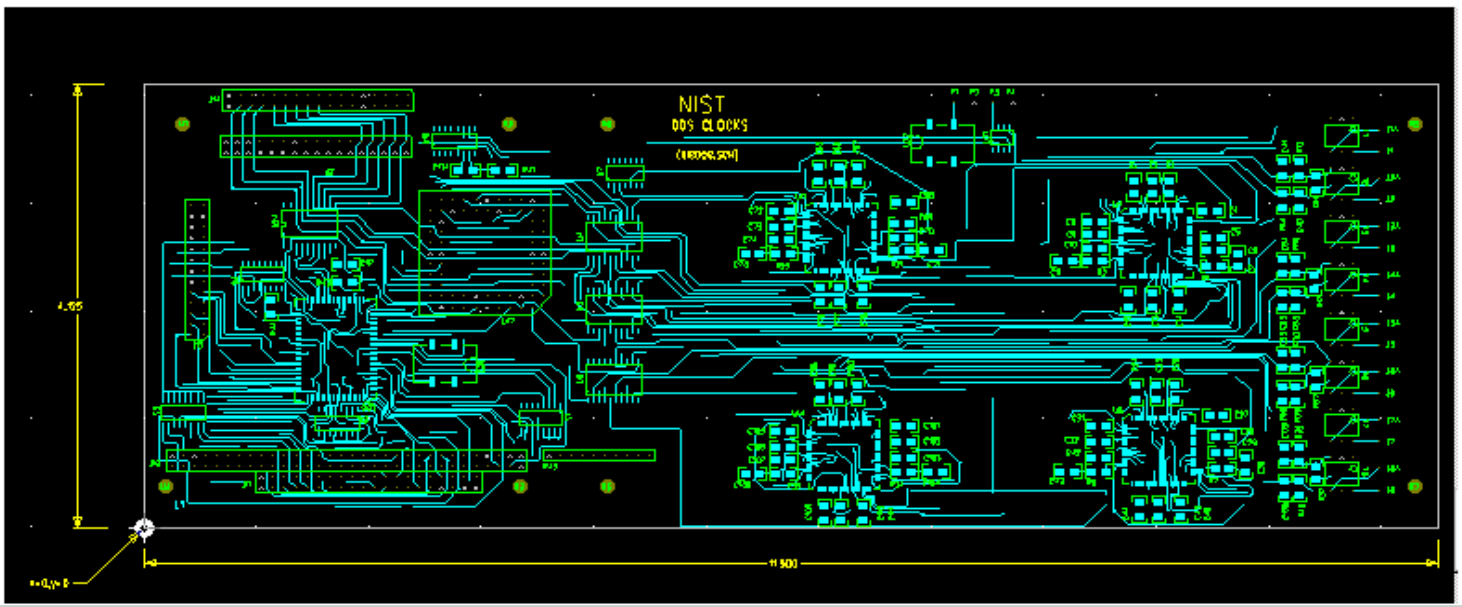
NIST Part#: 122998

**NOTICE: Experimental - the Disclaimer on the Product Data Package page applies.**

A functional description ddsclks page is available for this PCA.

---

Top Assembly View; see also Top Parts Placement View PDF file

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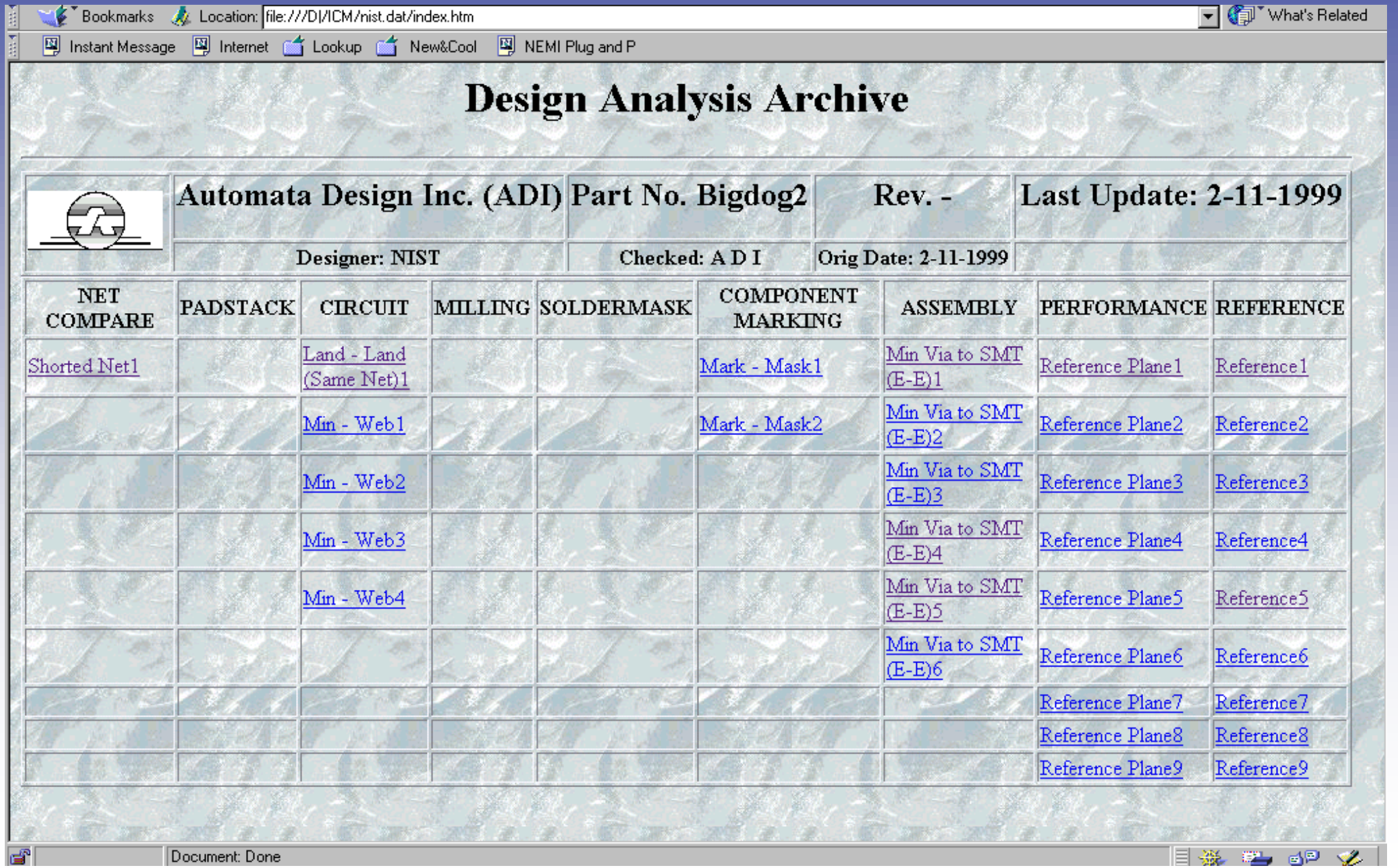
# Pay-per-Use: Manufacturability Analysis



# Pay-per-Use: Manufacturability Analysis

Bookmarks Location: file:///D|/ICM/nist.dat/cad_sht1.htm What's Related

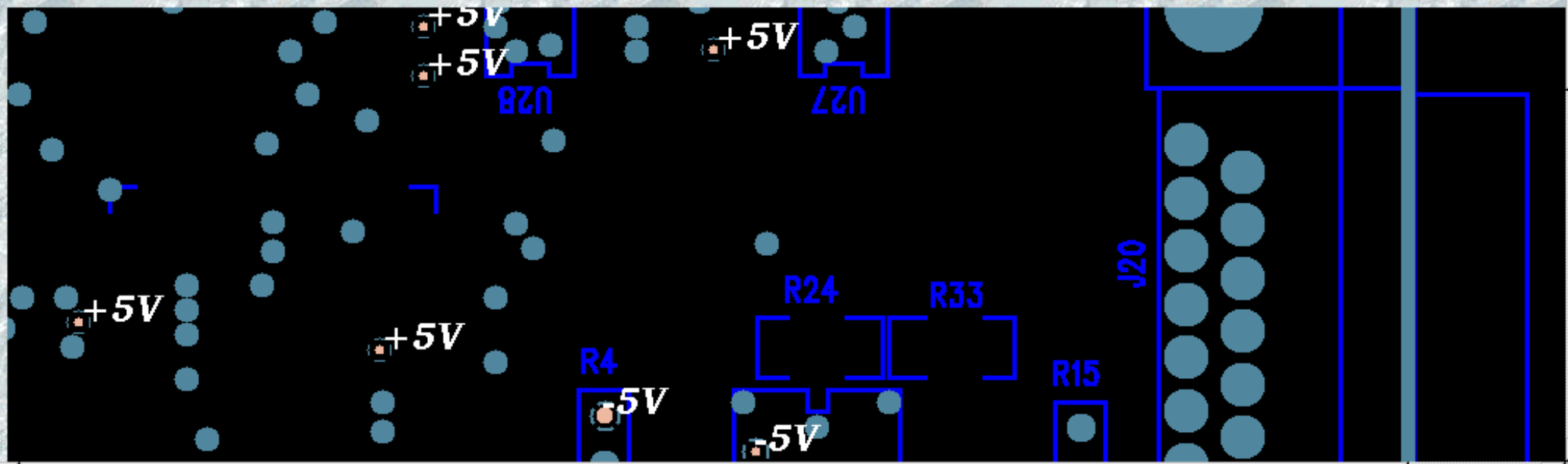
Instant Message Internet Lookup New&Cool NEMI Plug and P

## Design Analysis Archive

Return to Index Page

| | Automata Design Inc. (ADI) | Part No. Bigdog2 | Rev. - | Orig Date: 2-11-1999 |
|---|---|---|---|---|

| Violation Type | NET | Layer |
|---|---|---|
| Shorted Net-1 | -5V, +5V, | 1 (Top Circuit), 3 (Plane), 4 (Bottom Circuit), 7 (Top Marking), 9 (Plated Thru Holes), |

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File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Location: http://www.gencam.org/ What's

Instant Message Instant Message Internet Lookup New&Cool NEMI Plug and P



# GenCAM Conformance Test Module 0.5 (alpha) for IPC-2511A

The conformance test module (CTM) has been udated to parser data files for the IPC-2511A (proposal) for the GenCAM standard.

A GenCAM example that conforms to the 2511A specification is available. This file contains a couple dozen IPC land patterns that were hand coded by Dieter Bergman.

---

First name:

Last name:

email:

Filename: Browse...

☐ Generate Annotated Output (file size grows by about 20X.)

☐ Echo file with line numbers

Send Reset

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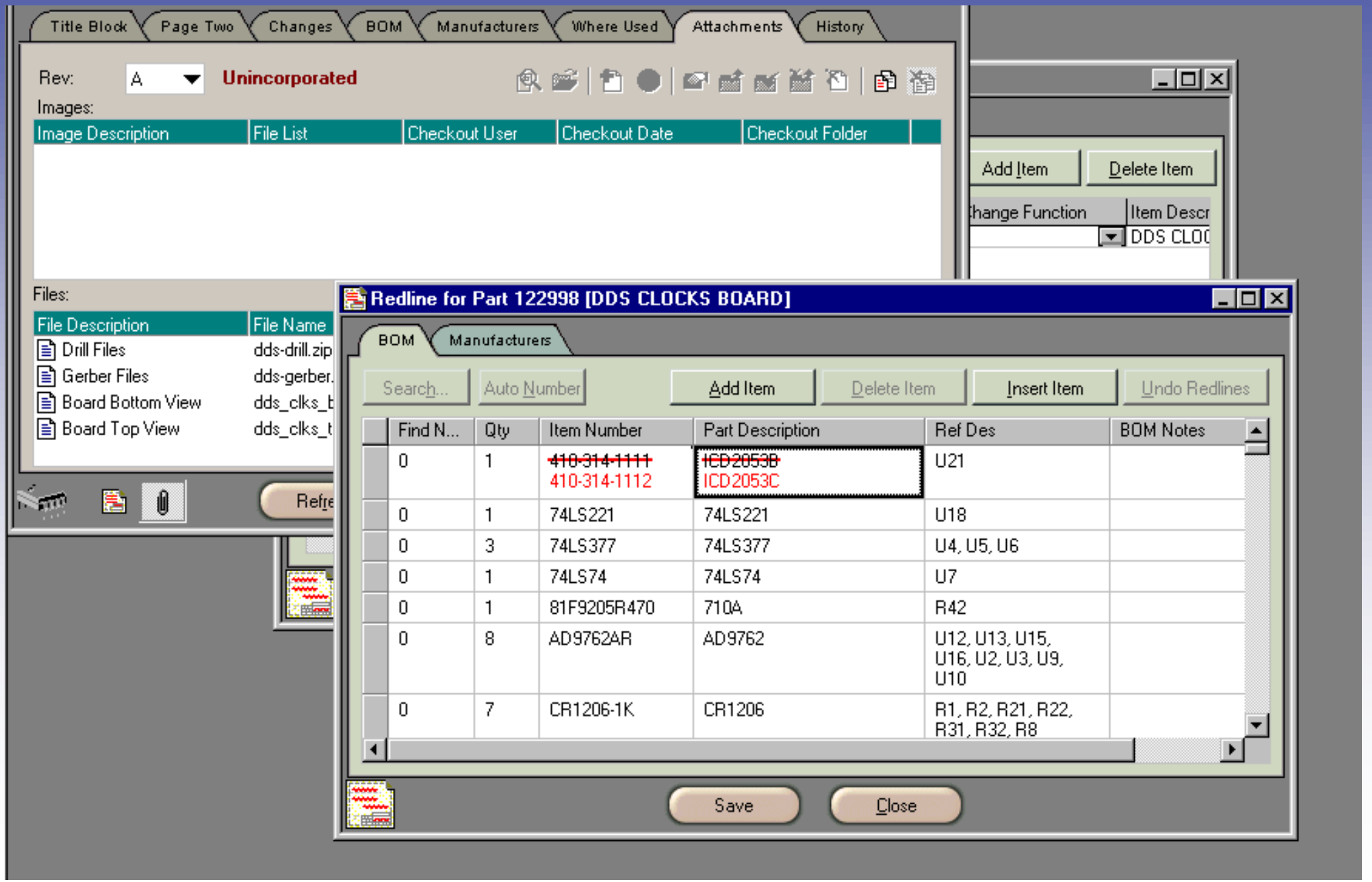
*Michael McLay*

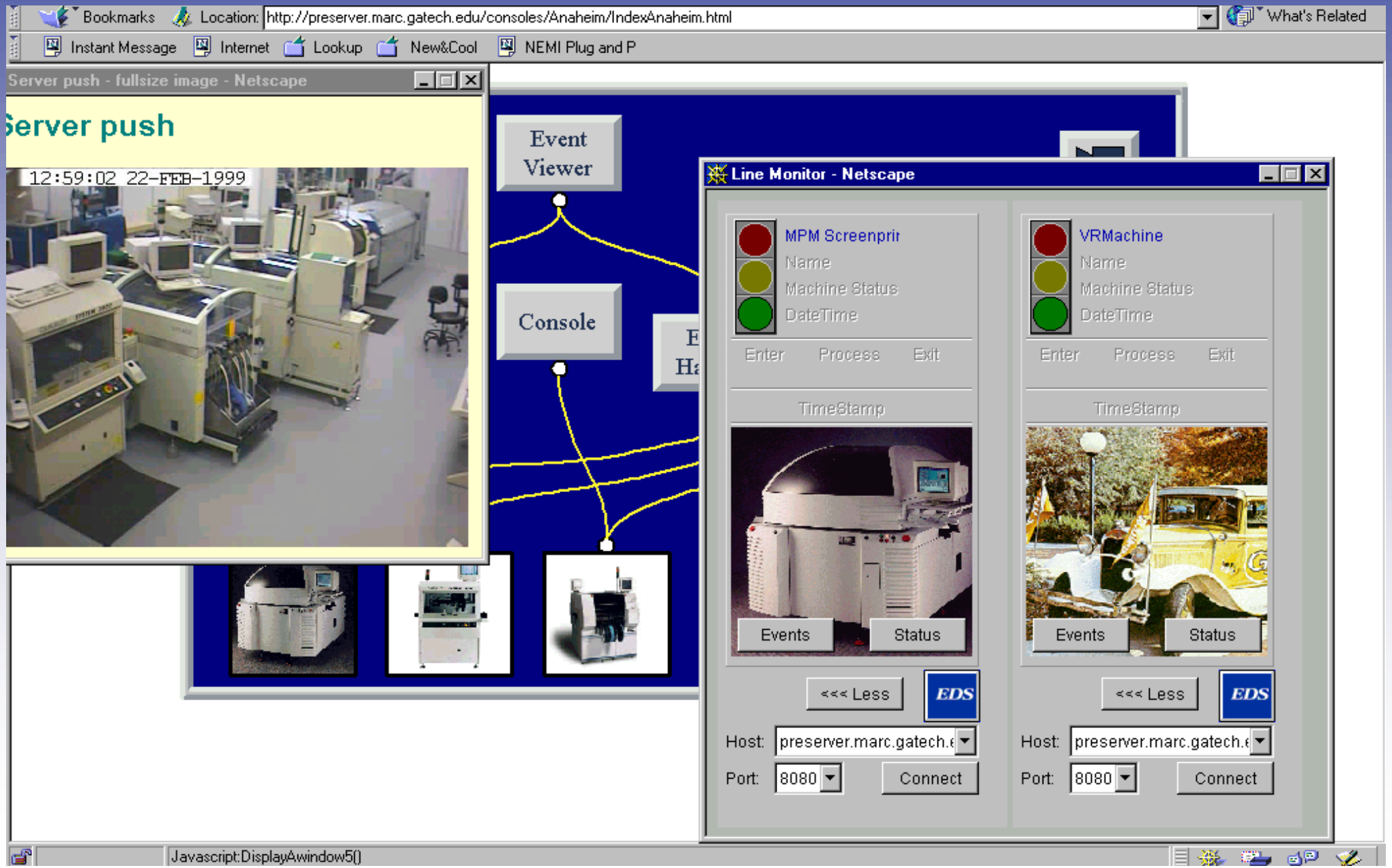
Last modified: Mon Aug 23 16:24:55 EDT 1999

Document: Done

# Collaboration Technology: Engineering Change Order

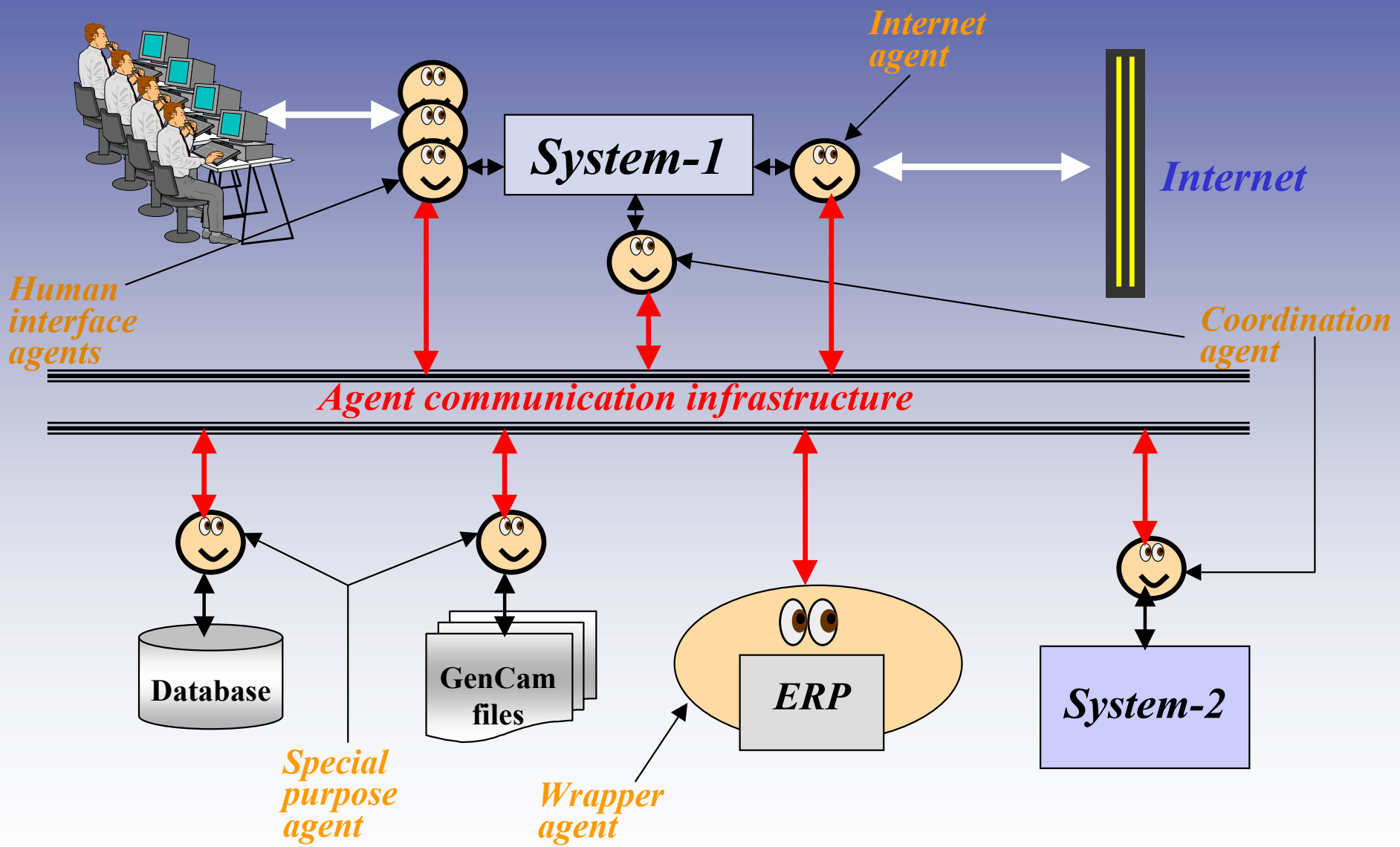


# Collaboration Technology: Checking Production Status



# Agent-Based Information Exchange

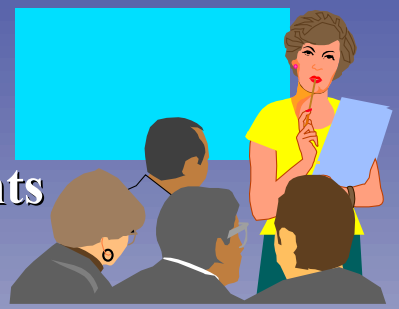
*Manager/designer/engineer/purchase agents*



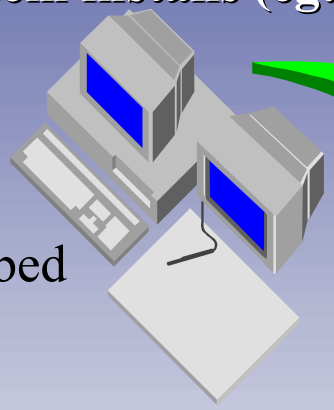
# ICM Plans

**Incorporate agents into Demo**
**Act as 'OEM' in NEMI Testbed**
**Further system installs (eg: Netfish)**

**Tech Deployment to SMEs**
**Industry checkpoints**



Industry Collaboration



Testbed

**ICM/VITSS**

Pay-Per-Use for SMEs

**ASP survey & analysis**

Standards Development, Testing & Evaluation

**GenCAM Test Module**
**NEMI Virtual Factory**
**RosettaNet Product Configuration**
**OAG Business Object Definitions**

Collaboration Technologies

**Agent infrastructure: Business case, implementation, evaluation**

# CONTACT US!


| | | |
|---|---|---|
| Barbara Goldstein | bgoldstein@nist.gov | 301-975-2304 |
| Albert Jones | jonesa@nist.gov | 301-975-3554 |
| **Tom Rhodes** | **trhodes@nist.gov** | **301-975-3295** |
| Richard Korchack | rkorchak@nist.gov | 301-975-8323 |


URL: http://www.mel.nist.gov/namt/projects/icm/icm1.htm